

DOCUMENT RESUME

ED 244 626

IR 050 724

AUTHOR Boss, Richard W.; McQueen, Judy
TITLE Document Delivery in the United States. A Report.
INSTITUTION Information Systems Consultants, Inc., Washington, DC.
SPONS AGENCY Council on Library Resources, Inc., Washington, D.C.
PUB DATE Oct 83
NOTE 84p.
PUB TYPE Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Delivery Systems; Facsimile Transmission; Information Dissemination; *Interlibrary Loans; *Library Services; National Surveys; *Program Effectiveness; Program Improvement; Questionnaires; *Time Management
IDENTIFIERS *Document Delivery Service; Full Text Information Retrieval

ABSTRACT

A study was conducted in 1983 to determine the current state of document delivery among the libraries and non-library document services of the United States and to ascertain what improvements need to be made. Of principal concern was that part of satisfaction time--the elapsed time from the library patron's lodging of a request to the time when the material is available for use--which is related to transmission of the material from the supplier to the requestor. Questionnaires were sent to 150 libraries selected at random from the "American Library Directory," the 20 Association of Research Libraries (ARL) institutions with the highest rate of supply, and 15 document delivery services; a response rate of more than 50% was obtained. A literature search and telephone interviews with major suppliers were also conducted. An average satisfaction time of 10 to 16 days and an average material transmit time of 6.3 days were found. Major problems were also found in turnaround time within supplier organizations. Nevertheless, an intensive, full-scale study of document delivery was not recommended because no evidence was found that the library and document service communities were seriously concerned about the performance of the document delivery system. This report describes the interlibrary loan (ILL) process, major document suppliers, the overall performance of the ILL system, document delivery options currently in use (telefacsimile and other image-based systems), the state of the art of electronic (full text) document delivery, and probable future document delivery trends. Also presented are a summary of significant document delivery statistics and a sample questionnaire. (ESR)

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DOCUMENT DELIVERY
IN THE UNITED STATES

A Report to the
Council on Library Resources

by Information Systems Consultants Inc.

Washington, D.C.

October 1983

IR050724

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Library of Congress Cataloging in Publication Data

Information Systems Consultants Inc.

Document delivery in the United States.

"December 1983."

Bibliography: p.

1. Document delivery--United States. 2. Inter-library loans--United States. 3. Information services--United States. 4. Library surveys--United States. I. Council on Library Resources.

II. Title.

Z713.5.U6I53 1983

025.6'2

83-26156

Preface

This report by Richard W. Boss and Judy McQueen marks the end of the first phase of a study of current document delivery activities in the United States. It was almost a year ago when the Network Advisory Committee recommended to the Council on Library Resources that such a study be made. The rationale was persuasively summarized in the first paragraph of NAC's "Statement of Work":

"Libraries in the United States rely on a variety of mechanisms--some more automated than others--to obtain materials requested by their end-users. They may turn to other libraries to borrow the item or to obtain its surrogate (e.g. fiche, film, or photocopy), or they may turn to other types of suppliers for document fulfillment and delivery (e.g. library networks, abstracting and indexing services, information brokers, or online search services.) Knowledge of these many systems and relationships with an evaluation of cost/performance tradeoffs is essential if libraries are to make intelligent decisions about when to share resources and when to buy services from other types of suppliers. Unfortunately, information on these activities is poorly reported and not widely known."

When the Council agreed to undertake the project, a letter was sent to a dozen consultants actively engaged in library research, asking for a response to NAC's "Statement of Work" in the form of a proposal. From the six bids received, Information Systems Consultants, Inc. was selected to do the study. The contract specified that the work should be undertaken in two phases, the first of which was to provide a "snapshot" of current activities based on a sample and an assessment of the need to go further with an intensive, full-scale study.

The consultants, after completing the "snapshot", recommended against proceeding further. Their reasons are well documented in the conclusion of the report. The Council agrees with the consultants, and has decided to supplement this report with a variety of other studies that will, taken together, add to the body of knowledge about information, its use and its delivery.

The projects under most serious consideration include a survey of users, both to determine how needed information is located and obtained, and to find out more about the extent to which users rely on non-library resources for fulfilling their needs for information. Experimental demonstrations of technologies to test alternative delivery mechanisms also will be considered for funding. Small grants will be made to libraries willing to experiment with alternative organizational structures to improve the process of interlibrary loan. Finally, a paper on the trends and developments in the commercial document delivery sector will be commissioned by the Council. Readers of this report are encouraged to submit their own suggestions for appropriate next steps, as well.

In the final analysis, we must find ways to extend access beyond the bibliographic system to the information itself. At the moment, increasing numbers of users express considerable frustration with their ability to obtain material that a much improved bibliographic apparatus tells them can be found at another library. The next challenge (both technological and organizational) is to remove the barriers to obtaining information needed for scholarship research.

Deanna B. Marcum
November 1983

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I. Introduction

Information Systems Consultants Incorporated (ISCI) was retained by the Council on Library Resources to determine the current state of document delivery among the libraries and non-library document services of the United States and to ascertain what improvements need to be made. For the purposes of this study, document delivery has been defined as the transfer of a document or a surrogate from a supplier, whether a library or a document service, to a requesting library. Of principal concern in this study is that part of the satisfaction time--the elapsed time from the library patron's lodging of a request to the time when the material is available for use--which is affected by the speed at which materials are moved from the supplier to the requestor.

Document delivery is but one time component in inter-library loan, the reciprocal activity of lending and borrowing among libraries or the securing of wanted materials from a document service. The other components of the process are the time a library requires to identify a location for the material and prepare a request, the time taken for the request to be transmitted to the supplier, the time required by the supplier to process the request, and the time the requesting library takes to make the material it has received available to the end-user. The study briefly touches on each of these other components, but does not attempt to duplicate the work that has already been done in these areas.

In the past decade a consensus appears to have emerged in the literature to the effect that no library--regardless of its size or level of financial support--can hope to be self-sufficient in its collections. While this has been argued for a century, the past ten years of tight library

budgets has significantly increased the number of articles on resource sharing. There have been an increasing number of comments to the effect that alternative mechanisms should be found to augment a library's resources from other libraries and non-library document services.

Much of the deliberation of the 1970s focused on the creation of a national periodicals system, a major component of which would have been a National Periodicals Center modeled after the highly successful British Library Lending Division. The philosophy was that while the most used materials would be made available locally, less frequently used materials would be retained in a dedicated collection which would be accessed by people committed to prompt processing of requests. Materials would be distributed using various methods of rapid document delivery. When it became obvious that the library community was divided on the matter and the commercial sector was strongly opposed, attention shifted to a more decentralized approach based on improving access to existing collections through better location tools--among them COM (computer-output-microform) catalogs and bibliographic utility data bases--and speedier request transmission through the interlibrary loan subsystems of the utilities and electronic mail systems. When these locating and requesting facilities had become widely available by the end of the decade, concern began to turn to the remaining component, document delivery.

At a conference on resource sharing in 1977 James Rush said "A library is a mechanism for linking a patron with a resource....Libraries have spent so much money, time, and energy in the acquisition of resources that the linking mechanism has been badly neglected....Pride in collection has got to be supplanted by pride in patronage. Once this change in attitude is achieved, resource sharing will follow logically."¹

Later that same year, Richard Dougherty, speaking of on-campus and interlibrary document delivery said "There seems to be greater emphasis on improving availability of and access to resources and less emphasis on materials acquisition....The need for better document delivery systems to handle larger capacities will emerge as a major library issue [in the future]."²

In late 1982 the Library of Congress Network Advisory Committee recommended a nationwide study of document delivery activities. While the statement of work prepared by the Network Advisory Committee used the term "document delivery," it was apparently the intent of the group to look at the entire interlibrary lending system and the commercial document service field.

It was in response to these and various other expressions of concern that the Council on Library Resources commissioned this study. In the discussions prior to the award of the contract it was decided that the consultants would not conduct a detailed study of the entire interlibrary loan system, but would focus on the specific problem of the physical movement of materials from supplier to requestor. Discussion of the overall interlibrary loan system is, therefore, limited to a single chapter of the Report.

This Report is based on a literature search, over 100 questionnaire responses received from libraries and document services, and telephone interviews with a number of major suppliers--both libraries and document services.

The questionnaires were sent to 150 libraries selected at random from the American Library Directory, the 20 ARL institutions with the highest rate of supply, and 15 document services. Over 50 percent of the randomly selected

institutions responded 20 percent of the ARL institutions, and 20 percent of the document services. Follow-up calls were made to 12 ARL institutions and document services to increase the response rate to more than 50 percent for all categories.

Chapter II presents an overview of interlibrary loan; Chapter III describes the major document suppliers; Chapter IV, the overall performance of the ILL system; Chapter V, the document delivery options currently in use; and Chapter VI, the state of the art of electronic document delivery. Probable future trends are discussed in Chapter VII and the consultants' recommendations to the Council are set forth in the last chapter.

The consultants concluded that in the absence of objective standards for measuring the adequacy of document delivery, the judgment must be subjective. While in their opinion the average of six or more days required for moving materials is too long, they did not find a consensus among those surveyed that changes are required. The concerns expressed in the literature and to the Council appear to be those of librarians who are in the vanguard, rather than the mainstream, of the library profession.

The consultants set forth three possible courses of action for planning improved document delivery. All of them assume that the library profession as a whole is not persuaded that this is a pressing issue.

The consultants also call attention to the fact that there are major problems in turnaround time within the organizations that supply materials to others. These deficiencies will not be affected by an improved document delivery system.

Specifically omitted from this study is the distribution of preprints and reprints by authors or publishers. While as many as five million preprint and reprint requests are believed to be generated annually³, few such requests appear to be lodged with libraries or document delivery services.

The consultants acknowledge with thanks the comments received from members of the Network Advisory Committee after the circulation of a preliminary draft of this report. We have tried to incorporate their comments consistent with the scope of our assignment.

II. Interlibrary Loan: An Overview

An interlibrary loan is a transaction in which printed materials or microforms are made available by one library to another an activity which includes the provision of photocopies or other copies as substitutes for the loan of original materials. Document supply is the provision of materials or photocopies--usually of journal articles--to libraries by a document service that does not support on-site borrowers. While a document service may be commercial or nonprofit, the large majority are commercial firms that charge fees for their services. Libraries generally do not consider the lending of films, videotapes, and other non-print media as interlibrary loan activities, nor do the document services provide this type of material.

Interlibrary loan is a basic activity of libraries. Most of the academic, public and special libraries in the US requested or borrowed materials from other libraries during 1980. About nine-tenths of 18,000 libraries surveyed reported doing so in a study conducted by King Research for the US Copyright Office in 1981.⁴ Some 85% of the libraries also received interlibrary loan requests during 1980, with a high of 97.2% for federal libraries and a low of 77.7% for special libraries serving nonprofit organizations. All of the statistics in this chapter not attributed to other sources were drawn from the King Research study.

Level of ILL Activity:

The total number of interlibrary loans in 1981 has been estimated by James L. Wood⁵ to be 19 to 20 million and by King Research at just under 25 million, including the provision of photocopies in lieu of loans. By library type the King estimates broke down as follows:

public	14,344,000	57.7%
academic	5,266,000	21.2%
federal	1,986,000	8.0%
special	3,262,000	13.1%

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Public libraries account for nearly 60% of all ILL activity. Public libraries also account for approximately 42 percent of the libraries that made interlibrary loan requests in 1981 and 76% of the libraries that received requests.

Despite the significant variance between these estimates, it is clear that interlibrary loan activity has not increased very much since 1976--when some 17.6 to 20 million requests were reportedly processed. This is borne out for serials by King Research, which concluded that the number of serial ILL requests increased only 9% between 1976 and 1981--from 6,030,000 to 6,546,000. Public libraries actually showed a decline of 22% in serials ILL activity and all other types of libraries an overall increase of 17%. Substantial numbers of libraries of each type, including 33% of the public and 42% of the academic, reported actual decreases in the total number of ILL requests sent to other libraries. The average activity of Association of Research Libraries members rose just 16% during this period.

Document Services:

Commercial firms such as Information on Demand and the Institute for Scientific Information have begun to supply materials needed by libraries and other organizations, virtually all photocopies of journal articles. A recent report by Arthur D. Little, Inc. estimates that private sector back-copy delivery currently represents about 10% of interlending, and that it is growing at the rate of about 15% a year--a growth rate substantially greater than that experienced by libraries.⁶ The King study of ILL made a similar estimate about the role of the commercial document services.

The King study determined that 10.5% of the nation's major libraries used a commercial document service at least once during 1980. Nearly 34% of the special libraries sent

requests to a commercial document service, accounting for 95% of the \$6 million in revenue of these suppliers.

Not all of the document services are for-profit organizations. The British Library Lending Division and the Center for Research Libraries are both document services rather than libraries, because they do not support on-site borrowers. They justify their existence solely on the basis of income received from the libraries and other remote users they serve.

The Major Suppliers:

Contrary to the popular mythology, the total number of interlibrary loans supplied by a library is not correlated to collection size. The very largest research libraries of the nation are not major suppliers to the nation or to their local regions. While libraries such as Harvard and Yale may be net lenders--lending more than they borrow--their activity is limited in relation to size and financial resources, and appears to be primarily interlending with other research libraries. According to a study⁷ by P. Robert Paustian, a more accurate generalization would be that publicly supported academic research libraries are handling the bulk of interlibrary loan traffic directed to large libraries. Of the largest academic libraries in the US, only the University of Illinois Library is lending far more than its collection size might suggest. The Universities of Minnesota and Wisconsin Libraries are also very active lenders.

Among the 200 or more companies listed in the Directory of Fee-based Information Services, 12 appear to be responsible for the bulk of the materials supplied to US libraries by document services. Three of the six largest suppliers of materials--each filling more than 100,000 requests a year--are document services. Two of the three are commercial organizations.

Finding Tools:

There has been a dramatic shift away from printed finding tools in the past decade. Some 17 state library agencies and an even larger number of consortia sponsor COM catalogs of the holdings of libraries in their areas. Most of them are produced from bibliographic utility archival tapes, with additional locations for libraries that do not use a bibliographic utility often added to the records prior to the production of the COM catalog. For example, the COM catalog of Colorado contains 650,000 titles contributed by 75 academic, public school and special libraries and is distributed to 233 libraries.

Online searching and messaging is becoming common. The data bases of the bibliographic utilities contain more records and more locations than the National Union Catalog and Register of Additional Locations and are easier and faster to search. The OCLC data base alone includes more than 9 million records and well over 110 million holding locations. As many as 8 million ILL location searches are made on the bibliographic utility systems each year. On OCLC alone, these searches currently result in the electronic transmission of loan requests at a rate of 1.2 million per annum. Up to 750,000 electronic mail messages requesting the full text of citations retrieved on the BRS, Dialog, and SDC data base services are transmitted to document suppliers by the electronic mail facilities of these systems.⁸ Over 300 libraries share automated circulation systems and search for locations through their system terminals.

The importance of COM catalogs, bibliographic utilities, and shared circulation data bases is underscored by the results of a Louisiana study of holdings added to its state-wide data base.⁹ The study determined that there is no large scale duplication among libraries in that state--

and very possibly not in other states. Of 72,335 titles submitted to the data base by Louisiana academic and public libraries during the sample period, 58,907 were unique; and only 8 titles were held by as many as 9 of the 16 participating libraries. Access to the collections of large numbers of libraries, therefore, seems to expand the number of titles available as well as the number of copies.

Types of Materials Requested:

According to the King ILL study, approximately three-fifths of ILL requests were for books, with about one-third for serials. Public libraries differ from other library types, however, in that nearly 86% of their requests were for books. About three-fourths of the requests generated by federal and special libraries were for serials, as were three-fifths of academic libraries' requests.

Some major suppliers--those responding to 5,000 to 120,000 requests per year--almost exclusively provide photocopies of serials. In an interview with ISCI the Linda Hall Library reported that 97% of what was provided on ILL in 1982 was serial literature. The National Library of Medicine and Engineering Societies Library each reported over 90% serial requests, and MINITEX, the Minnesota regional network, reported over 80% serial requests. Information on Demand, the largest commercial supplier, reported over 95% serials and the rest government documents, and the Institute for Scientific Information, the second largest commercial supplier, reported 100% serials. The only major suppliers responding to ISCI claiming that they supplied more books than serials in 1982 were the Los Angeles Public Library and the Philadelphia Free Library.

Age of Materials:

According to King Research some three-tenths of requests were for items published in 1979, 1980, and 1981. Almost exactly half of all ILL requests were made for items

published before 1976. Federal and special libraries tend to request newer titles than public and academic libraries; 48.8% and 48.7% respectively of items requested by these library types were published in 1981, 1980, or 1979. For public and academic libraries 26.7% and 27.4% respectively were for items published during these three years. Requested serial articles are not as old as requested books. Almost half of the serial items requested were published during or after 1979, while only one-fourth of books requested were published during this same period.

Reasons for ILL Requests:

The reason for an interlibrary loan request is unknown in half the cases, but of those analyzed by King Research, some 2.2% were for replacement purposes, 45.2% were school related, and 45.1% were job related. Almost all of the unknown category was accounted for by public libraries. Nearly 83% of the academic library requests were school related and three-fourths of the federal and special library requests were job related.

The Role of the ALA Code:

A new ILL code was prepared by the Reference and Adult Services Division's National Interlibrary Loan Code Revision Subcommittee in 1980. Like the 1968 Code it is a guide for interlibrary loan among libraries that have no formal arrangements with one another. According to Kroll, reporting on the progress of the Subcommittee in 1979, "The entire thrust of the new code is toward the thorough use of local resources and meticulous screening of requests before jumping up to the national level."¹⁰ The 1980 Code also puts less emphasis on the status of the borrower and more on whether he or she has a genuine research need. There are fewer restrictions on requesting various types of materials, leaving such decisions to the lender's discretion.

The pattern being promoted by the Code is reflected by library practice. Over 78% of the interlibrary loans processed by the more than 100 libraries which were contacted by ISCI were within the state. The exceptions to this in-state emphasis were the libraries that participate in the Research Libraries Group and a number of special libraries that rely heavily on commercial document delivery services. One another factor has also reduced the percentage of ILLs handled within a state--the use of the OCLC ILL subsystem. Libraries that use OCLC as their primary finding tool and cannot find locations within their states will go out-of-state rather than looking for the materials in nearby libraries not represented in the OCLC data base.

Form of Request:

Requests for ILL are submitted by mail on standard ILL forms, telephone, teletype, electronic mail, bibliographic utility ILL subsystem, and through shared circulation control systems. There appears to have been no comprehensive study of all of these forms of request. It is known that of the one million requests sent through the OCLC ILL subsystem last year, nearly 86% were monographs.¹¹ In contrast, virtually 100% of the requests sent through the Dialog Dial-order electronic mail system were for serials and documents.¹² ILL requests sent through the shared circulation control systems in Connecticut and Illinois were almost all for monographs.¹³ The nature of the available data bases in each of these electronic systems appears to be the factor which determines what type of material is sought in the requests transmitted by the systems.

Refusal to Fill Requests:

Few libraries report refusing to fill interlibrary loan requests received from other libraries. In the King Research study only 14% of libraries reported having refused interlibrary loan requests. By type of library, 28.1% of

the academic libraries and only 5.9% of special for-profit libraries reported such refusals.

Fill Rates:

The large majority of requests (89.5% of serials and 86.5% of books) were filled according to the King study. Academic libraries experienced a slightly lower fill rate--than other libraries--85%. Data gathered by several others have confirmed that the rate is generally over 80%. Palmour's study¹⁴ for the North East Wisconsin Intertype Library System determined that the fill rate for all types of libraries was 83% and Boals' study¹⁵ of the Southern California Interlibrary Loan Network determined 85% for periodicals and 70% for books.

The fill rate may be improving. In 1968 Wood found that the success rate for more than 68,000 requests received and sent by 3,363 organizations was 84.2%.¹⁶ For 80,000 requests processed by the OCLC ILL subsystem during a nine-week period in 1978, the fill rate was 97%.¹⁷ The improvement is marked only when the OCLC ILL subsystem is used because another 1978 study done by the 19 campus system of the California State University and Colleges System¹⁸ found a fill rate of only 79% and Wisconsin libraries were able to obtain only 83% of needed items in 1979.¹⁹

Photocopies in Lieu of Loans:

Only about 21 percent of the 1980 requests were filled with photocopies and the balance by the loan of the original material according to King Research. Of the serial requests filled some 77.9% were satisfied with photocopies and of the book requests some 60.5% were satisfied with the loan of the original. Some 7.5% of the serial requests were filled with originals. Only 8.2% of the public library requests were filled with photocopies, reflecting the emphasis on the interlibrary lending of books among public libraries. In

sharp contrast, academic library requests were filled with photocopies 47.1% of the time, federal 59.6% of the time, and special 65.2% of the time.

ILL Costs:

The cost of ILL appears to vary widely depending on the size and type of library and the methods of cost accounting used. The Westat Studies²⁰ concluded that the average ILL cost \$7.61 for borrowing and \$5.82 for lending. Another more recent study placed the cost of borrowing at \$10.69 and the cost of lending at \$6.23.²¹ A review of 20 ILL cost studies by Ferriero at MIT determined that many of the studies that place ILL costs lower than \$10 for borrowing and \$6 for lending have not included all indirect costs. Were it to be assumed that the true cost of ILL to both borrower and lender is over \$16 per request, the annual cost of the ILL activity in the United States is more than \$400 million.

Conclusion:

While ILL is apparently not growing very rapidly and while it appears to represent an activity level equivalent to only some 1% of most library's circulation statistics, it remains an important activity because it augments individual libraries' resources. To satisfy that additional 1% from local holdings would require a substantial broadening of the scope of library collections. At a cost of \$400 million per year, ILL also represents a significant financial commitment by the libraries of the nation.

III. Major Suppliers

Some sixty libraries and a dozen commercial document delivery firms each respond to more than 20,000 requests a year. One of these major suppliers to US libraries is a foreign organization, the British Library Lending Division. ISCI contacted several of the major suppliers by mail and telephone. A standard data collection form was used, but responses varied a great deal because some interviewees lacked information and others were reluctant to disclose it.

British Library Lending Division:

Over 800 US organizations and individuals are registered to use the BLLD's document supply service. In 1981-82 they submitted some 59,580 photocopy requests to BLLD, representing nearly 12% of the organization's foreign demand. The BLLD, therefore, ranks among the top ten suppliers to the US market. The US users are primarily special libraries and commercial information services. Information On Demand of Berkeley, CA, the largest US commercial supplier, is the largest single US user of BLLD.

The BLLD's service is world wide. Over 5,000 libraries are registered users. In 1981-82 some 496,500 requests for photocopies were received from foreign organizations and individuals, as against nearly two million from within the UK. There were also 29,000 foreign requests for loans.

The importance of BLLD to the US must be examined in the light of its role in the United Kingdom. That country's document supply system is highly concentrated on a single supply source--the BLLD, one of the three major divisions of the British Library--rather than being based on cooperation among local libraries. The Lending Division has a collection of 4.5 million books and serials, including 55,000 current serial titles.

All requests have to be submitted on BLLD forms. Few loan requests are received from the United States because the charge is approximately \$7.50 per loan for this service --a higher charge than levied for the service in either the UK or Europe. Photocopy charges are approximately \$75 per 20 coupons for all non-UK libraries. Each coupon is good for 10 pages of photocopying or 20 pages of microfilm of original text--the approximate equivalent of 37.5 cents per photocopied page or 18.75 cents per film page.

There has been no subject breakdown of US requests, but BLLD staff are of the opinion that the vast majority of them are in the fields of science and technology. Serials made up 70.5% of all BLLD requests received in 1981. It was possible to satisfy 94% of the requests, with 86% of the total coming from stock.

The average satisfaction time--the time from date of request to date of delivery--for a foreign order is 12 days, if an item is requested electronically. The time increases to as much as 27 days if the request is submitted by mail. Only 2.1 days is normally required for in-house processing of an order, but foreign orders take a little longer because they often represent more difficult, "last resort" requests.

Almost 50% of the materials supplied within the UK are moved by commercial vans. The library regions contract with commercial firms to serve a number of libraries on an overnight basis. The largest region, the London and Southeast Region (LASER), moves some 600,000 items a year at an estimated per item cost of 50 pence. The British document delivery system is discussed at greater length in Chapter V.

Center for Research Libraries:

The CRL of Chicago processes over 45,000 requests a year, of which it fills nearly 33,000 or 72% from its own

collection and by referral to the BLLD. One-third of the requests come by first class mail one-third through the OCLC ILL subsystem or Tymnet electronic mail system, and one-third by Telex or TWX. Almost all requests are from Center members--virtually all academic libraries. Some 28% of the materials are supplied as photocopies--all of them sent by first class mail. All other materials are sent by UPS--realizing a gain of at least two days over delivery by USPS library rate service.

Chemical Abstracts Service:

CASDSS, the service maintained by the American Chemical Society's Chemical Abstracts Service is one of the largest document services despite being one of quite limited subject scope. In 1982 some 57,567 requests were received of which 84.2% were filled. Nearly 30% of all requests were received online, primarily over Dialog's Dialorder facility. Over 62% of the requests were received via USPS first class mail. Some 73% of the requests were for serials and most of the rest for monographs. Photocopies were provided for 67% of the requests and originals were sent for the rest. Some 92.3% of all requests were processed within two days and 99.7% within five days. The fast processing time appears to explain why CAS attracts so many orders even with a \$12.00 per item charge--a charge which includes the copyright fee when there is one. The filled orders were sent by first class mail in 72% of cases and by air mail in 11% of the cases. UPS accounted for 16% and Express Mail 1.1% if shipments outbound. Overnight services accounted for only .3% of the shipments.

Data Courier, Inc.

This commercial service has permission to make photocopies of 88% of the more than 500 publications cited in Data Courier's ABI/Inform data base file. The service is available for articles published as early as January 1975.

Online orders can be placed through both Dialog and SDC. Orders are shipped first class in North America, and airmail overseas. If specified, orders can be shipped Express Mail or Federal Express, but such requests are uncommon. Article retrieval rates are \$6.50 per article for deposit-account orders and \$7.95 for others. Pharmaceutical News Index (PNI) data base retrievals are available at \$25 per article. Telefacsimile service is available, but it "has not yet caught on." The company representative would not supply details about volume of requests or the performance of various document delivery methods.

Engineering Societies Library:

The Engineering Societies Library of New York supplies just under 50,000 items a year, almost all photocopies. Over 85% of the service is to special libraries. The charge is \$5.00 if requested by mail or electronic mail and \$10.00 if requested by telephone. Approximately 20% of requests come by electronic mail and only a small percentage by telephone. Processing time is 5 to 10 days unless the request is designated rush. Over 95% of all materials are sent by first class mail. Some 5% are sent by commercial courier services. A small number of book loans to libraries within New York are sent USPS library rate.

Federal Document Retrieval:

Located in Washington, DC, this service provides document services in legal, financial securities, banking, trade regulation, communication, labor, medical, manufacturing, and trade matters. It retrieves citations from national or worldwide data bases and materials from archives, libraries, government agencies, and private sources. The company primarily serves local customers and is typical of the majority of document services. Next-day delivery by first class mail is achieved in most instances and, when the need is urgent, same-day delivery may be arranged using a local courier service at a cost of \$7 to \$12 extra.

Free Library of Philadelphia:

The Free Library of Philadelphia process almost 10,000 ILL requests a year, some 76% of which originate within the state. Approximately 32% of the requests are for photocopies. Monographs are sent by state library agency sponsored delivery service or Delaware County delivery service if going within the state and USPS library rate if going outside the state. Photocopies are sent by first class mail. All service but USPS library rate is considered very good to excellent. No more than three days is required for in-state document delivery and up to two weeks for out-of-state. The Library seeks only to recover the cost of photocopies in excess of 10 pages at a rate of \$2.00 plus \$.10 per page.

Infoquest:

Based in Kensington, MD, Infoquest provides data base searching, information research, and document delivery services. The company handles requests for readily available published materials and specializes in difficult-to-locate unpublished documents, US government reports, legislation, specifications, and patents. Orders may be placed online through the Dialog and SDC electronic mail systems. Infoquest has no public or academic library customers. Materials go out by first class mail or local courier.

Information On Demand (IOD):

Headquartered in Berkeley, CA, IOD is the world's largest commercial document service. In the past year over 120,000 requests were processed. IOD maintains staff at 20 major public academic and special libraries to photocopy materials. There is a standard price of \$14 per item for photocopying up to 20 pages, including copyright royalties (up to \$4.00) and postage by first class mail or UPS delivery. Discounts of up to \$3.00 per item are provided for high-volume users. Rush service is \$6.00 extra per item

plus express delivery, if requested. Some 78% of materials --which are virtually all photocopies--are sent by first class mail or air mail. In addition to air mail, UPS, Federal Express and other commercial services, telefacsimile service is offered. UPS delivery is 10% of the total and Federal Express 12%. Virtually no materials are sent by telefacsimile, but 40% of requests are received that way--nearly twice as many as arrive by electronic mail. Almost all requests are from special libraries and other organizations. Fewer than 10% of requests originate from academic and public libraries.

Institute for Scientific Information:

ISI of Philadelphia is unique in that it provides tear sheets or original journals rather than photocopies. Over 6,000 titles are available, the stock being maintained for up to five years. ISI processes over 100,000 requests a year, of which more than 95% come from special libraries. Over three-fourths come by mail, 10% by electronic mail, 10% by telefacsimile, and some 3% by telephone. Most orders include the OATS number assigned by ISI and published in its directories and online data bases. The charge is \$7.00 plus \$1.00 if the OATS number is not given. Telephone service is \$1.00 extra. USPS first class mail is used for 95% of all document delivery and Federal Express or Emery for the remaining 5%.

Linda Hall Library:

The Linda Hall Library of Kansas City fills over 50,000 requests a year, almost all in science and technology. Almost 90% of the requests come in by US mail and 10% by the OCLC ILL subsystem. Special libraries account for 60% of the requests, academic 25%, and public 15%. Photocopies are provided in response to 95% of all requests. The fee is \$2.00 plus \$.40 per page. The fee includes shipment by library rate. Some one-fourth of requestors pay extra for first class mail.

Los Angeles Public Library:

LAPL supplies over 10,000 items a year, of which 75% are to libraries within the state. Library rate is used for 85% of the materials, most of which are monographs. A consortium operated delivery system is used within the metropolitan area, but only 5% of materials are moved this way. Some 10% of all deliveries are by UPS, including a large number of the out-of-state shipments. A fee of \$5.00 is charged for loans outside California. The performance of USPS library rate service was rated as fair, all others as good.

National Library of Medicine:

The National Library of Medicine of Bethesda, MD supplies over 160,000 items each year, almost all of them to health sciences libraries. Photocopies constitute almost all of the shipments and first class mail is the dominant form of document delivery. The NLM tried facsimile service, but there were too few receiving nodes to generate a high enough volume to achieve low unit costs.

The majority of requests came in by mail, but electronic mail requests are increasing--offsetting a decline in TWX requests. In the past year at least 40% of all requests came by either electronic mail or TWX.

National Technical Information Service:

NTIS is a major clearinghouse for technical reports, supplying over 4 million copies to libraries and other organizations and individuals. This is not at present an interlibrary loan service, but NTIS has at various times offered a journal article copying service. NTIS does not maintain stocks of journals, but relies on nearby libraries' collections to obtain the copies when it provides photocopies. This service is no longer being promoted because of severe criticism from those who think that a Federal agency

should not be duplicating a service that is available from several private sector sources.

Universal Serials and Book Exchange:

Historically, USBE of Washington DC has been a non-profit supplier of books and journals to libraries seeking to acquire materials for their collections from the Exchange's stock of materials not needed by other libraries. USBE's resources include 100,000 monographs and 1.3 million issues of 40,000 serial titles. In the past year USBE has begun promoting the use of its serial stock by libraries seeking to meet ILL needs. While USBE prices are comparable to the cost of photocopies from other sources, the requesting libraries have the benefit of originals--both in terms of quality and freedom from copyright constraints. The charge is \$5.50 per issue for members and \$10.00 for non members. There is a \$2.00 rush service charge. All serials issues are sent by first class mail.

In the past few months online requests have been accepted from the BRS and OCLC electronic mail systems. Some 10% of the orders already come through these services.

University of Arizona:

The University of Arizona Library supplies some 17,850 items a year, of which more than 69% go outside the state. Approximately 44% are provided as photocopies. First class mail is used 50% of the time and almost all other materials are sent library rate. Just under 1% are sent Express Mail. It is believed that most materials reach their destinations within three days. The minimum charge for photocopies is \$3.00.

University of Minnesota:

University of Minnesota is the largest supplier among libraries, processing in excess of 120,000 interlibrary loan requests a year. This activity level is approximately the

same as that of Information on Demand, the largest commercial document service. Approximately one-third of this large volume of requests come directly to the library and two-thirds come through MINITEX, the regional interlibrary loan service--some 80% of the MINITEX referrals are for photocopies of serials.

University of Washington:

University of Washington Library processes some 110,000 ILL requests each year from throughout the Pacific Northwest. The Library has set up a self-supporting office separate from its own ILL borrowing service known as the Resource Sharing Program. Fast turnaround is provided and material are sent by the fastest available service for which the recipient is prepared to pay. That is usually first class mail for photocopies, but the RSP participated in a regional telefacsimile program in early 1983. The technical results were satisfactory but costs were \$.50 to \$3.19 per page--primarily dependent on volume of use. Only the libraries of Alaska opted to continue to use the telefacsimile service after March 1983.

Warner-Eddison Associates, Inc.:

Based in Cambridge, MA, Warner-Eddison offers both search and document services. The company bases its services on the resources of the Greater Boston area specialized libraries and also obtains material through the online ordering services available through Dialog, BRS, and SDC. Their search scope includes technical reports, papers, foreign patents, UN documents, US government documents, conference proceedings, catalogs, and out-of-print books and articles. The charge is \$10.00 for a single-item order with Boston-area retrieval or \$8.50 for each multi-item order. If retrieval is from outside the Boston area, the charge is \$12.50 per item. First class mail and local courier services are the primary document delivery methods.

Wisconsin Interlibrary Loan Service:

The Wisconsin Interlibrary Loan Service is headquartered at the University of Wisconsin Library at Madison, but is independent of it. Some 90,000 of the 110,000 requests received in the library each year are from Wisconsin libraries and are addressed to WILS. The regular ILL department of the library meets its own needs and responds to requests from outside the state. A majority of the requests received by WILS are filled from the university library's collection and the rest are referred to other libraries. Photocopies are sent out by first class mail and books by UPS and library rate. No detailed statistics were available. There is no charge for libraries that are entitled to use the service--primarily in-state institutions.

IV. Performance of the Interlibrary Loan System

After the fill rate, the most critical measure of the performance of the interlibrary loan system is the satisfaction time, or the time between a patron lodging a request and the time the material is made available to that patron. While the fill rate is quite high and appears to be rising, the satisfaction time is a matter of some concern because it appears to be in well in excess of 10 days. The studies that have been done suggest that, at best, the average time from request to receipt of materials varies from just over 10 days to nearly 16 days.²² It is not uncommon for requests to be subject to satisfaction delays of up to a month.

The Elements of Satisfaction Time:

Satisfaction time consists of the following elements:

- (1) The time the requesting institution takes to locate the material and prepare a request,
- (2) The time the request is in transit to the supplier,
- (3) The time required by the supplier to process the request,
- (4) The time the requested material is in transit to the requestor's library.
- (5) The time it takes the requesting institution to provide the material to the requestor.

All of these elements together determine how long a library patron actually waits for requested materials.

Locating and Requesting Materials:

There appear to be no studies which focused specifically how long libraries take to locate and request materials. Relevant information cannot be obtained by examining the studies that have surveyed the entire ILL process because most have measured satisfaction time from the date the request leaves the library to the date that the material

is received in the requesting library. Presumably, the time varies a great deal depending on work load and the priority that individual libraries give to ILL. Anecdotal evidence gathered in telephone interviews suggests that it is not uncommon for a patron request to require two or three days for location and request preparation before it is sent to the supplier.

The process is likely to be further extended in those situations in which the requesting library processes ILLs through a hierarchical structure, checking first for a local supplier then moving the request on to a regional center for further searching and transmittal. Common in many public library situations, this process has not been the subject of carefully delineated satisfaction time studies.

Transmitting Requests:

It is easier to determine how long it takes a request to travel from the requesting library to the supplier. Typically first class mail takes one to two days between two points in the continental US. The bibliographic utility ILL subsystems and electronic mail systems transmit requests in seconds, although many receiving institutions access the requests only once a day, thus reducing the effective speed to one day.

Processing Requests:

Most suppliers, both libraries and document services, claim to process orders quite rapidly, usually within two days. Almost all of the commercial services contacted by ISCI claim an average processing time of less than two days, although one major firm acknowledges that it can take up to a week. MINITEX, the Minnesota regional network, claims that 75 percent of all orders are filled within two days; a figure comparable to the 2.1 days quoted by the British Library Lending Division at Boston Spa and the two days

quoted by the New York State Library. In sharp contrast, the perception of the requesters interviewed by ISCI is that processing time in other libraries is generally one week or more. Part of the discrepancy of views may be that the suppliers count processing time from when they begin working on a request, rather than from the moment of its receipt.

There appears to be little documentation on this issue, but there is significant consistency in the anecdotal evidence to the effect that large research libraries take up to 8 days to take action on a request.

Material Transit Time:

There are virtually no studies of document delivery speed or the time that requested materials are in transit. Most of the information that is available must be drawn from studies that have looked at the broader issue of satisfaction time--the total elapsed time between placing the order and actual receipt of the materials. The studies are usually designated interlibrary loan turnaround time studies and have for the most part been local or regional in scope and reflect both widely divergent methodologies and unique local practices. Dodson's study²³, one of the most comprehensive and best documented of those identified by ISCI, found that the average satisfaction time was 11.6 days. The most time consuming element was transit of materials to the requesting library, which averaged 6.3 days.

A study by Kaya and Hurlebaus²⁴ determined that the average transit time for materials using the US Postal Service [presumably, USPS library rate service, as the study related to the transit of books] was five days even among libraries only 112 to 262 miles from one another. The United Parcel Service delivery time among the same libraries was two days. The Northern Network Committee of California²⁵, a group which reported substantially shorter satis-

faction time than any other study examined, concluded that delivery time was three days--some 60% of the total elapsed time--and that there was no difference in performance between the US Postal Service and UPS.

While geography plays a factor in transit time, an even more important factor is the number of sorting facilities through which a shipment must pass. An item moving between two major cities on opposite coasts may only go through one sorting center in each city. If the shipment goes from one small community to another, it may be sorted in the shipping community, in two intermediate regional centers, and again in the receiving community. Each sort adds to the transit time. In the case of USPS library rate, it may be as much as a day in each center. For first class mail the time is usually measured in hours. Federal Express, one of the most successful of the overnight services, has discovered that it is more effective to do all sorting in a single national center in Memphis, TN than to have several regional centers. A package from Los Angeles to San Francisco, therefore, is sorted in Memphis.

Satisfaction Time:

More than a dozen satisfaction time studies have been reported in the past few years. The Boals study²⁶ of the Southern California Interlibrary Loan Network determined that the average satisfaction time for periodicals was 17 days and for books 31 days--the poorest satisfaction time of any study examined.

The NELINET study²⁷ of the New England region--the one which included the largest number of libraries and the broadest geographic area--determined that average satisfaction time was 10.5 days, with requests filled from in-state suppliers requiring 8.5 days and those filled by out-of-state suppliers, 18 days.

The Western New York Library Resource Council and NYSILL, the New York statewide network, determined in 1976 that average satisfaction time was 10 calendar days.²⁸ The mean satisfaction time in Idaho in 1978 was 11.39 days, but the range was from one to 39 days according to a study by Herman.²⁹ This is one of the few studies that asked patrons about their satisfaction. Some 95% of those surveyed said they were satisfied with the lapsed time. A study in Illinois³⁰ determined that the average turnaround time for all types of libraries was 13.9 days, but requests from public libraries to system libraries took 18.8 days if filled and 29.7 days if referred.

Baker³¹ studied satisfaction time in a medium-sized library for requests transmitted by OCLC, TWX and the US Postal Service. The total average lapsed time from request to receipt was 12 days for OCLC, 17 days for TWX and 24 days for mail. This suggests that not only is one medium slower than another, but that supplying libraries respond differently to requests sent by various means. The OCLC and TWX requests are both sent electronically, but the OCLC requests presumably contain more complete citations and they remain in a library's electronic mailbox for only four days before being moved to the next library. It is presumably both easier to process the request and more important to act promptly.

Delivery to the End-user:

The lag between the receipt of the material in the requesting library and the time it is in the hands of the end-user appears not to have been studied. The studies which quote overall satisfaction time do not break out this element. Presumably it can vary from hours to days, depending on whether the requesting library phones the patron, sends a written notice, or waits for the patron to return to inquire about receipt.

Studies at Variance With the General Picture:

Virtually all of the studies examined reported average satisfaction times of more than 10 days. Only two studies reported a substantially shorter satisfaction time. The Northern Network Committee of the California State University and Colleges³² claimed an average of 5.1 days with 70% of all requests having been satisfied within three days. The average is suspect, however, because the calculation was made at the end of the study while there were still outstanding requests. The reason for the unusually rapid satisfaction time may also be partially attributable to the fact that the study was done in conjunction with a trial of telefacsimile equipment for the transmission of ILL requests. Participants appear to have suspended their normal procedures to participate in a special trial.

Bell Laboratories³³ reported a turnaround time of six days when mail requests were submitted and four days using telephone or telefacsimile. A telephone interview with one of the libraries at Bell established that the libraries make a special point of finding suppliers who respond rapidly.

Performance of Document Services:

There is virtually no information available about the satisfaction time for requests sent to document services. Only one study by the Carborundum Library³⁴ has reported on the average time for 103 requests: 10.5 days--not much different from the performance reported for interlibrary loan among libraries.

Satisfaction of Users:

The most surprising lack in the literature is in studies of user satisfaction. One of the most useful studies was done in the United Kingdom and was limited to the effects of delay on the users of a medical school library. The study³⁵ reported that 61 of 294 transactions studied, or 19.9% resulted in some inconvenience to the requestors.

Some 20 of the 77 persons who received their materials within three days reported some inconvenience, but only 30 of the 166 who had to wait up to one week did so. Of those who waited one to two weeks, only four of 30 reported some inconvenience. Reducing the satisfaction time to one week would, therefore, not have had a significant effect on the inconvenience of library users. The group most likely to report inconvenience was apparently those who were getting the best performance from the ILL system.

Another British study by Houghton and Prosser³⁶ focused on special libraries and determined that delay caused inconvenience in only one-tenth of cases even though 61% of the respondents waited for longer than one week.

A much older study³⁷ conducted by Nelson Associates for the New York State Library in connection with a 1968 telefacsimile experiment determined that 70% of respondents thought the material would have been equally useful if it had arrived two or three days later than the six or more working days generally required.

V. Current Usage of Document Delivery Options

While problems in locating and requesting materials are being solved or alleviated by technological developments such as the ILL subsystems of bibliographic utilities and electronic mail systems, there appears to be less progress in the improvement of the delivery of the physical document from the supplier to the requesting library. The length of time it typically takes materials to move from point to point is as great or greater than it has been at any time in the past three decades. This is not due to a lack of options, but to a pattern of overwhelming reliance on the US Postal Service.

Reliance on USPS:

While some 15% of ILL requests are now being sent electronically, the material which is sent in response to the requests goes by USPS more than 95% of the time. All respondents to the ISCI mail and telephone surveys--both libraries and document services--use US mail for sending the majority of materials. Virtually all photocopies are sent by first class mail, but books are sent by a wider variety of document delivery means--including USPS Priority Mail and library rate mail; and to a lesser extent library-sponsored delivery services, and commercial couriers. Nevertheless, one-third of the respondents send half or more of all materials by USPS library rate. One out of five send 85 to 100% of all materials library rate.

Library-sponsored and Courier Services:

Only 48% of respondents use a library-sponsored delivery service for part of their document delivery. The pattern varies a great deal geographically because this type of service is available in only 25 of the 50 states and is truly statewide and available to all types of libraries in only three jurisdictions. Some statewide services are

limited to public libraries, a few to public libraries and major academic resource libraries, and some to academic libraries only. The majority of the services are operated by libraries, but in a few areas contracts have been awarded to Purolator or United Parcel Service to operate the service.

Only respondents from Connecticut and Pennsylvania--both states with state library agency sponsored delivery services--report using the statewide delivery service more than 40% of the time, with some libraries reporting up to 100% reliance on the service for the in-state movement of materials. The Pennsylvania service, while sponsored by the state library agency, is operated by a Purolator under contract. The responses from the state's libraries indicate that the service is highly satisfactory. Both the Connecticut and Pennsylvania services are described in detail later in this chapter.

Commercial Couriers:

Some 35% of the respondents use a commercial surface courier such as Purolator or United Parcel Service some part of the time under other than a multi-library contract. In no case is the reliance greater than 15% of all items sent or received, although several RLG members reported that they send and receive most book ILL's within RLG by UPS. The choice of surface courier by all types of libraries is usually limited to books because photocopies can be sent and received by first class mail. Only one library, the California State University at Long Beach, reported using UPS for as much as 60% of all ILL. It rated the service very good as compared with good for USPS services.

Fewer than 20% ever use an overnight service such as Emery, Federal Express, or UPS Air. No respondent reported using this for more than 3% of document delivery needs. Almost all of the use was by special libraries and most was

for materials sent between two libraries within the same company or for materials requested from a commercial document service.

The commercial document services report that they send only 10% of their materials by surface courier such as UPS or Purolator and another 7 to 12% by an overnight service such as Emery or Federal Express. One large commercial firm reported that while it receives 60% of all of its requests electronically, it sends out 78% of its materials by first class mail. It will use UPS surface service at its discretion only when it is less expensive than USPS--or when USPS service is known to be particularly poor to a specific destination. All use of overnight service is at the express request of the customer. Another major service, Chemical Abstracts Service, reported that while nearly 30% of all requests are received online and 6.7% by telephone, only 1.4% of requestors stipulate that USPS Express Mail or an overnight courier service is to be used to transport the materials.

Electronic Document Transmission:

Only 2% of the libraries and 10% of the document services have ever used telefacsimile for document delivery and only on an experimental basis. Two commercial document services with telefacsimile capability reported that while they receive a substantial number of requests by telefacsimile--40% of all requests in the case of one major service--materials are rarely transmitted by fax. None of the libraries or document services contacted have experience sending materials by any other type of electronic document transfer medium. Only three libraries and six document services have had experience receiving the full text of a document online from a remote data base. The documents retrieved were generally newspapers and journal articles.

Public Library Practices:

Public libraries tend to use first class mail for photocopies and library rate mail for books unless a regional or statewide library-sponsored delivery service is available. Since the bulk of public library ILL's are books, library rate mail continues to be used for over half of all materials shipments by just under half of the public libraries responding. The next most popular means of sending and receiving materials is a library-sponsored delivery service. If the library pays by the item for the use of a delivery service, it will use the service primarily for books and send photocopies by first class mail. If an annual fee is levied that is not tied to number of items sent or the service is without charge to the library, all types of materials are sent by the delivery service.

Academic Library Practices:

Academic libraries rely substantially on first class mail for photocopies and a wide variety of delivery means for books, including library rate, priority mail, regional or statewide library-sponsored delivery services, and UPS. They tend to use a delivery service when available, especially when pricing is not on a per-item basis. Out-of-state requests are most likely to be sent priority or library rate mail. Research Libraries Group participants are the most regular users of UPS for shipment of books. Inasmuch as 60% of the materials sent and received are photocopies, first class mail is used half or more of the time by nearly 100% of all of the academic library respondents.

In 1981, the Association for Research Libraries (ARL) conducted a survey of document delivery methods in member libraries, noting that "finding ways to improve both communication and the traditional delivery service has been a matter of increasing interest as the bibliographic data

bases grow and users request more material."³⁸ Of the 90 responses, 55 reported use of truck or courier for some part of their document delivery, but it was not clear who sponsored the services being used.

Special Library Practices:

Special libraries rely heavily on first class mail because they request photocopies of journal articles more than three-fourths of the time and because they place a premium on reducing the satisfaction time. The special libraries also account for almost all of the use of overnight services according to the commercial document services. In ISCI's survey, only 30% report using overnight services for as much as 5% of all requests. Special libraries appear not to be regular participants in statewide library-sponsored delivery services, but a number reported that they participate in local and regional delivery services. The difference appears to be that statewide services are usually sponsored by the state library agency--an organization usually charged with supporting public library service; while local and regional services have usually been launched as a collective effort by a number of libraries in an area.

Library Satisfaction with Document Delivery:

The general satisfaction level with all forms of document delivery was unusually high among the librarians and document service specialists surveyed by ISCI. Every type of service but library rate USPS service was characterized as satisfactory or better by 85% or more of all types of libraries responding. Library rate USPS service was singled out as less than satisfactory by some 23% of the respondents. Only three respondents had specific suggestions for improving document delivery: there should be subsidies for net lenders to send by UPS, there should be more use of full-text and telefacsimile transmission, and the state or regional delivery service should come to all libraries

rather than selected libraries. Six respondents who are net borrowers answered the question about document delivery by commenting that the libraries that supply materials should process requests more quickly. Five net lenders volunteered that requestors should submit requests which have been more adequately verified.

Librarians generally appear to select the most economical document delivery method available even though it may add to document delivery time. The only exceptions appear to be in those states where a statewide document delivery service is sponsored by the state library agency and all or part of the cost is subsidized. Library-sponsored document delivery is the first choice for movement of books by public and academic librarians in both Connecticut and Pennsylvania. This does not mean that a delivery service is of necessity more expensive than the use of the mails. In Great Britain--where library-sponsored delivery services move the majority of all ILL materials--libraries actually save money by using commercially operated delivery vans rather than the postal service.

The British Experience:

It might seem that the problems of transport should not be as important in Great Britain as they are in North America with its much greater area, but delays in delivery and perceived high costs have led British librarians to established the world's most extensive programs of library-sponsored document delivery services.

Russon³⁹ reported that each year over 3 million items are borrowed on interlibrary loan by the 4,000 libraries of the country. In studies undertaken to estimate the cost of ILL, it was found that 25% of the cost was for first class postage. A major feasibility study of non-mail transport suggested that a national scheme would be practical and

would save some \$500,000 per year for the libraries. Pilot operations were undertaken and on the basis of the results a regional delivery system was established. The first led to several others and now all but the most sparsely populated areas of the island are covered.

In the London area, 14 vans provide daily service among the BLLD, London libraries and other libraries. Loans coming from Boston Spa are boxed and sent by overnight train to London, where they are picked up, sorted by area and sent out on vans. Vans deliver and pick up items for return to BLLD and other London libraries. Using this scheme libraries get faster and cheaper delivery, with the cost being less than postage because the annual volume is over 600,000 items in the London area alone.

Connecticut: a State Library Operated Service:

The Connecticut State Library has operated Connecticar (C-Car), a statewide delivery service, since 1976. The program serves 180 public libraries and makes additional stops at 12 academic institutions. Some other libraries receive service through a nearby public library. The eight vehicles--all leased from the State and operated by eight full-time employees of the State Library--stop at the libraries from 2 to 5 days each week. One-third of the libraries get daily service.

It is rare for anything to require more than three days to go from one library to another. The annual budget is claimed to be \$56,000, but appears to be only the cost of the vehicles. The salaries and benefits are presumably at least two-and-one-half times that amount. There is no charge to the libraries served by the delivery network.

Pennsylvania's IDS:

The Interlibrary Delivery Service of Pennsylvania (IDS) is a cooperative association of more than 120 academic,

public, special and school libraries throughout the state of Pennsylvania organized for the purpose of providing "delivery of interlibrary loans and educational items" among its members.

IDS traces its beginnings to 1969 when the Area College Libraries of Central Pennsylvania received an LSCA Grant which, combined with their own membership fees, enabled them to develop a delivery service for interlibrary loans that extended from Central Pennsylvania to Philadelphia and included 35 members, among which were six district library centers and the Pennsylvania State University. Its membership increased to 67 members in 1973. Then in 1975 an LSCA Grant enabled the membership to reach a peak of 156 members as it extended its service across the state. During this period of time the number of items moved through the system expanded from 27,000 items in 1970 to 250,000 items in 1976.

From 1975 to 1979 IDS operated its own fleet of rental trucks throughout the state. At that time increased costs for fuel, repairs and labor necessitated a review of IDS procedures. After consulting with a transportation expert, IDS acted to contract its delivery services. Its new mode of operation began in 1980. In that year IDS transported more than 160,000 items for more than 110 members whose locations span the state. IDS provides pick-up and delivery services on a three days per week schedule.

The annual budget is over \$200,000, with nearly \$60,000 coming from LSCA funds. Membership payments by participants constitutes almost all of the other revenue.

The current charging mechanism for IDS is as follows:

\$ 950	to ship up to 1,000 items
\$1,250	to ship 1,001 to 1,700 items
\$1,450	to ship 1,701 to 2,500 items
\$1,750	to ship 2,501 to 3,700 items
\$1,950	to ship 3,701 to 5,000 items
\$2,250	to ship 5,001 or more items

A cost study in 1981 determined the following costs to a cross-section of participants:

<u>LIBRARY</u>	<u>ITEMS SENT</u>	<u>FEE</u>	<u>COST PER ITEM*</u>
A	935	950	.96
B	952	950	.99
C	1523	1250	.82
D	1616	1250	.77
E	2206	1450	.66
F	1806	1450	.80
G	3619	1750	.48
H	2539	1750	.68
I	4590	1950	.42
J	4298	1950	.45
K	8193	2250	.27
L	8264	2250	.29

* LSCA funds pay \$.33 per item in addition to the above.

The costs for sending four items, including staff time and materials were determined in 1981 to be:

IDS	\$1.09
U.S. MAIL	3.73
UPS	8.24

Performances of the systems were compared in 1981 and found to be best for IDS in all instances. The transit time was a uniform two days while USPS service was three to four days and UPS two to seven days.

<u>IDS</u>	<u>LEAVE</u>	<u>ARRIVE</u>
Lehigh to:		
Drexel	4/26	4/28
Carnegie Mellon	4/26	4/28
Penn State	4/26	4/28
<u>U.S. MAIL</u>		
Lehigh to:		
Drexel	4/26	4/29
Carnegie Mellon	4/26	4/30
Penn State	4/26	4/29
<u>UPS</u>		
Lehigh to:		
Drexel	4/26	4/28
Carnegie Mellon	4/26	5/03
Penn State	4/26	4/28

US Studies:

A number of states have or have tested library-sponsored delivery services to improve speed of delivery. Several studies have reported on tests of various modes of delivery to determine relative speeds and costs. Typically, the comparison includes the USPS, United Parcel Service and a consortium-operated truck delivery.

In these studies there is normally a trade-off between costs and speed or reliability of delivery, with USPS offering the least expensive service and all the others faster, usually more reliable, service. Placing a benefit value on faster delivery has been a major objective. What is the value of reducing delivery time by some unspecified percentage? As mentioned earlier, Kaya and Hurlebaus⁴⁰ found in a sample of loans for a medical library that the median document transfer time among libraries located from 112 to 262 miles from one another was 5 days for USPS and two days for UPS. For the sample, the total cost for uninsured USPS delivery was \$81, for insured UPS, \$517--the UPS insurance is not optional. It was concluded that for many libraries, the additional cost could not be justified.

A study for Illinois libraries conducted in 1979⁴¹ was undertaken to develop a plan for a statewide delivery system which would satisfy the existing needs for transporting library materials to people in all parts of the state. The consultants analyzed the traffic flow, traffic patterns, lapsed times, reliability and cost of delivery methods, including air, rail, USPS, UPS, bus, courier and dedicated library van. The cost of dedicated delivery is relatively high, but with substantial benefits to users in speed and reliability. While "findings indicate that further definition of a delivery system would depend in part on the trade-offs made between effective delivery time, costs and reliability," the dedicated system was recommended as the preferred method.

Comments of the Respondents:

Using a library sponsored document delivery service may not result in a good overall satisfaction time according to the libraries responding to the ISCI survey. One library in a state with a statewide service limited to public libraries reported that while 99% of its requests are met by libraries within the state and transit time is rarely more than three days, over 75% of its requests took more than 15 days.

An academic library in another state that receives only half of its requests by a consortium sponsored delivery service and the rest by first class mail, reported receiving 65% of its 8,124 requests within 10 days and getting excellent service regardless of the document delivery method used.

The Canadian Experience:

Document delivery in Canada is affected, as is everything, by the distances among population centers. With deteriorating mail service, other forms of delivery have become common. Several examples are reported in the literature. A recent pilot project (now operational) was conducted by Clyde from September 1979 to March 1980.⁴²

Among the most ambitious programs is that of CISTI, the Canadian Institute for Scientific and Technical Information. For example, twice a week shipments go from CISTI to the University of Calgary by air courier. At the University of Calgary, the ILL service sorts items and alerts other libraries or its patrons to arrange to pick up their loans. The method has been considered very successful. It has reduced delivery time substantially. The shipment arrives the day after it is dispatched from Ottawa. Apparently this method entails no great cost to CISTI and relatively little cost to the University which is already a major source of ILL for the Calgary area. Unfortunately no cost studies have been done.

Basic requirements for this type of arrangement with CISTI include a local coordinating institution (the largest CISTI user in order to minimize redistribution), participation of all local CISTI users and payment of costs by local participants. Other delivery schemes operate between CISTI and libraries in Winnipeg, Edmonton, Halifax, and with a slightly different pattern with Ontario and Quebec universities.

In Ontario, most regional libraries report the use of some non-postal form of delivery such as a regional delivery van or courier or commercial delivery. In most cases, the service goes to all libraries in the region and may connect with a coordinating point in adjacent regions as well as with academic libraries in the region. Frequency varies from daily to weekly. The services are believed to be cost effective, but no studies appear to have been published.

Another recently instituted scheme is outlined in the Library Delivery Service Handbook⁴³ of the Federal Libraries Liaison Office of Canada. This service is intended to speed delivery among the federal government libraries in the Ottawa area and with other libraries that frequently deal with the government libraries. The service coordinates with the regional delivery systems of Ontario and Quebec, thus extending the scope beyond the Ottawa-Hull area. Costs are shared equally by all stations. Again, no cost figures are available.

VI. Electronic Document Delivery

Despite the possible long-term potential of various electronic document delivery technologies and the high degree of interest in these technologies being displayed by librarians and publishers, no large scale electronic document delivery system is yet operational, nor is electronic delivery likely to displace more familiar techniques such as US mail, courier, and truck delivery systems within the foreseeable future. It is likely that the next several years will see the continuation of present delivery modes, with new methods of delivery being introduced when and if they become economically feasible. In any event, it is probable that electronic delivery mechanisms will be feasible for only that portion of the ILL traffic which involves journal articles--40 percent of the total ILL load.

Among the electronic delivery technologies that offer possible alternatives to the conventional methods of document delivery are: telefacsimile; the electronic distribution of machine-readable full text or document images to remote locations from centralized data banks; and the distribution of such resources through their "publication" on microfilm or, in digitized or machine-readable form, on optical video or digital disks. This section of the report examines these and other approaches currently receiving attention, and assesses the likely practical impact of the technologies on document delivery over the next five to ten years.

Telefacsimile:

Basically, telefacsimile is a method of sending an image of a page of printed or graphic material from one point to another by converting the image pattern of the original into electronic signals and transmitting these signals over a telecommunications medium, usually telephone

lines, to a distant site where the signals are decoded and reproduced to form a replica of the original.

Telefacsimile has been available for some years and has been the subject of experimental trials in libraries since the mid-1960s. Developments in telefacsimile in the past five years have improved the quality and resolution of the images transmitted while substantially increasing the speed of transmission, thus reducing the impact of telecommunication charges in the use of the technology for document delivery. Improvements in the technology have also removed most of the inconveniences inherent in the older technology, resulting in equipment that is compact, easy to use and mechanically reliable. In certain situations, high speed digital facsimile offers an enticing prospect for the speedy transmittal of journal articles or extracts from monographs.

As detailed in the most recent full scale study of the application of facsimile technology in libraries--McQueen and Boss' "High-Speed Telefacsimile in Libraries" published as the January-February 1983 issue of Library Technology Reports⁴⁴--the economic application of the technology depends upon its use in situations in which the volume of material transmitted is high enough to permit the amortization of equipment charges over a sufficient number of page transmissions per month to result in an acceptable cost per page transmitted. Given the current state of the technology and related factors such as telecommunications charges, an "acceptable" cost appears likely to be achieved only under one of the following conditions:

- a) very high transaction volumes among points in a facsimile network--volumes of at least 500 pages per month and, preferably, 1,000 pages per month at each site.
- b) in medium to high volume transaction situations where high-speed facsimile is being evaluated in

relation to the cost of other instantaneous or near-instantaneous delivery methods such as telex electronic mail, commercial air courier services, or USPS Express Mail

c) in very "local" applications involving facsimile transmissions within a single telephone service area and the application involves other cost trade-offs such as are entailed in providing specialized staff and resources at a single as opposed to multiple locations, or where organizations or individual users ascribe such importance to rapid document delivery that they are prepared to meet a cost premium for the provision of such rapid document delivery.

In those situations in which a library's document delivery needs accord with one of these criteria, the successful implementation of facsimile technology presupposes the selection of appropriate equipment with relevant optional features and careful consideration of in-library procedures for using the equipment--consideration which takes into account cost reducing techniques such as batching multiple transmissions to a single site, and use of low-rate evening hour telecommunications rates. Staff orientation to overcome resistance to the technology, in particular, resentment over the fact that most library materials require photocopying before they can be processed through a facsimile unit is also important.⁴⁵

Of all the electronic options suggested for improving the speed of document delivery, telefacsimile has a distinct advantage over the others in that it is the only technology certain to support the delivery of all types of serial materials from all sources.

Other Image-Based Delivery Alternatives:

The technological developments in image scanning and transmission that have benefitted telefacsimile can also be applied in other document delivery scenarios. To date no

such systems are widely and publicly available, but their development is probably only a matter of time and economics.

One possible direction is indicated by a feasibility study on document digitalization and teletransmission that the Commission of European Communities commissioned from Arthur D. Little.⁴⁶ The report proposed a system called ARTEMIS (Automatic Retrieval of Text from Europe's Multi-national Information Service) that would be based on present technology and on the existing European information networks. ARTEMIS would meet the retrieval and delivery needs of users by providing a full text of documents for which references had been retrieved. The report contended that ARTEMIS is technically feasible, but that "market forces would not bring it into being. The scale of operation and extent of cooperation between parties with different interests are beyond what entrepreneurs or small co-operative ventures can achieve."⁴⁷ Therefore, the consultants proposed a phased-in approach with initial large-scale subsidization.

In an effort to control copyright, a group of major periodical publishers proposed a different approach to electronic delivery in ADONIS (Article Delivery Over Network Information Systems). An analysis of 2.5 million requests to the BLLD indicated that 30% were from this group's journals, and that a large proportion of the requests were from journals published in the last five years. ADONIS would continue to use BLLD as a clearinghouse, but all requests for articles from these journals would get special treatment. The text and graphics of the journals would be digitized onto optical disks capable of storing 400,000 pages per disk. Articles requested would then be printed in good quality copy and distributed by BLLD, which would pay a copyright fee.⁴⁸ A beginning date of 1984 was planned but recent changes in the composition of the sponsoring group may well have affected both the timing and the scope of the project.

Meanwhile, current trials at the Library of Congress will provide a practical test of the procedures and problems entailed in the large scale storage and retrieval of digitized document images on optical disks. If the results are positive, future studies will be required to determine whether the appropriate means of distribution is replication of the disks and distribution of copies or electronic transmission of the data or the master disk.

Recent developments in the application of videodisk technology by companies such as LaserData⁴⁹ demonstrate the practicality of replicating videodisks containing either digitized document images or machine-readable full text. LaserData has developed a process whereby videodisks containing digital data can be readily and inexpensively mastered and replicated. The data on these disks can be retrieved and displayed using relatively inexpensive videodisk players and simple microcomputer interfaces. The company sees the publishing industry as the primary market for its services.

What all these potential developments have in common is the likelihood that proprietary interests will operate to ensure that the products made available through these techniques will represent only a limited portion of the universe of materials requested through interlibrary loan and thus will provide only a partial solution to the document delivery problem. Despite the fact that it is now conventional wisdom that a high proportion of interlibrary loan requests for serials can be met from a small proportion of serial publications, it is unlikely that any single interest group will be able to negotiate the rights to provide these journals on a single electronic publication product. The developments in data base services that provide access to machine-readable data bases might be an appropriate model for future developments in this area.

The only other current model for future distribution of "packages" of current journal literature--Information Access Corporation's recently announced microfilm-based on-site document backup service for the material indexed in its Magazine Index--also represents a limited selection of the universe of currently published serial material, and one in which the majority of the titles covered are published by IAC's parent company, Ziff Davis. The acceptability of the currency of the service--microfilm of the latest issues of the titles is distributed monthly--has still to be demonstrated.

New combinations of existing technologies that bring together computers, micrographics, and telecommunication offer other possibilities for the distribution of document images. The integration of the technologies results in systems that are more cost effective than those relying solely on computer storage devices because micrographics offer an extremely low cost mass memory and publication alternative. In such systems, the computer provides prompt access and telecommunications avoids the need to duplicate the information at several locations.

In the typical computer assisted retrieval (CAR) system microfilm and microfiche are stored randomly in cartridges or carousels to eliminate the possibility of misfiling. The film or fiche is indexed by author, title, subject and other suitable access points. Index numbers are coded directly on the film or fiche, or on a carrier which holds the fiche. With computer control over the storage devices, a user can search the files from any one of a number of reading stations, retrieve a microform and see a video image of it in less than five seconds on the same terminal that has been used to access the computer. The capacities of the largest devices currently available from companies such as Access, Infodetics, Ragen, and Teknekron is from 18 to 30 million pages per system.

The more sophisticated systems retrieve fiche from one of several carousels, digitize the image on the fiche and electronically transfer the information to magnetic disk storage, which acts as a temporary storage for that image and thousands of others, allowing other users to access the film/fiche carousel. The image is transferred from the disk to a high resolution video display unit. The image can be converted to paper using an associated "hard-copy unit" or printer. Copies cost less than \$.05 per page.

In this and all other delivery systems which rely upon remote access to a centralized file of data, remote communication can be achieved by using existing telephone lines, cable transmission or satellite links. The use of one of these modern telecommunication technologies results in simultaneous access for those at a location removed from the central files and those at the site of the central files.

Not all computer assisted retrieval systems are as described above. Many less expensive systems require manual retrieval of the film, cartridge, or fiche by a system operator. They are only capable of local display on a microform reader because these system do not support the digitization and transmission of the microform image. Sophisticated CAR systems of the type described have been demonstrated to be cost effective in banks, construction engineering, and in a wide variety of other businesses. Several federal agencies use them to control document literature and large archives. In order to be cost effective the files must not only be large, but active. At what level the activity level is high enough to justify CAR is a matter of opinion. One arbitrary threshold is a daily retrieval volume of 700 items or more.

CAR systems are not likely to be cost effective for individual libraries because very few of them have high enough uses of microform collections. They may be cost

effective for a group of libraries sharing a single system. For example, a complete file of the US Congressional documents on microfiche costs over \$8,000 per year. For nine libraries purchasing the collection separately that would be \$72,000 per year. If a single file could be shared electronically using a system costing less than \$64,000 per year, there could be a marked improvement in access without additional cost.

Document Delivery Alternatives Based on Full-Text

With the growing prevalence of computer storage of the full text of documents and improvements in the electronic transmission of data, there is widespread discussion of the direct supply of machine-readable text, particularly of journal articles, from the publisher to the library or directly to the end user.

Although the issues and circumscribing factors which apply to the image-based technologies discussed in the previous section also apply to considerations of document delivery alternatives based on the communication or distribution of the full text of documents, the technologies embody some fundamental differences that could impact upon their relative rates of implementation and/or acceptance. Whereas the image-based systems involve the storage, distribution and communication of data in machine-readable form, the data so transmitted is essentially meaningless until re-assembled for output on a display device such as a CRT terminal or a printer, at which time the "pattern" of the original image is recreated and becomes capable of providing information. With delivery systems based on the full-text alternative, the machine-readable data is not a meaningless representation of an image, but a coded representation of the information content of the alphanumeric characters which comprise the document. While not capable of manipulation to form an exact copy of a document as it might appear in

printed form, such data is "meaningful" in that standard computer searching techniques may be applied to identify and retrieve relevant elements in the document surrogate.

Of potentially greater impact on the document delivery aspect--though decreasingly so as data storage and communication techniques continue to develop--are the differences in the amount of machine readable data that is required to represent the contents of a printed page in full-text and image/facsimile form. Image storage is much more resource consumptive than full-text storage. The range of the difference varies depending on factors such as the complexity of an image, the resolution at which the image is scanned and the data compaction techniques applied before the data is transmitted or stored. At the present time it is not unusual for the amount of digital data required to reproduce a facsimile of a printed page to be 20 times more than is required to represent the alphanumeric contents of that page in machine-readable form.

Systems based on each of these storage and distribution approaches are not yet sufficiently widely available to enable assessment of likely user reactions. The full-text approach gives the advantage of machine searchability at the cost of tabular or graphic data; the image representation alternative lacks the flexibility of full-text but does provide an exact copy of the original.

With the obvious exception of the microform based systems, most of the techniques which can be applied to the publication and distribution of digital data encoding document images can also be applied to the publication and distribution of digital data encoding the full-text of documents.

VII. The Next Five Years

A review of the literature and interviews with librarians and document service specialists lead to the conclusion that there will be no major changes in the ILL system if individual libraries and consortia continue to function without coordinated planning. The changes that will occur without planning are likely to be:

- (1) Increased electronic transmission of requests via bibliographic utility ILL subsystems, shared circulation control systems and electronic mail systems, including those of the commercial data base services.
- (2) A gradual increase in the number and percentage of documents provided by commercial document services.
- (3) Increased use of surface courier services by the commercial document services and special libraries.
- (4) Heightened awareness by those using electronic means to locate and request materials that the delivery of documents is the time consuming element in the ILL system, but no significant shift away from present delivery patterns.

We draw these conclusions despite the great potential of carefully designed document delivery systems that utilize established ground transport services and electronic technology. The facts are clear: there has been a steady increase in online searching and requesting of materials, but there has been no corresponding shift to faster document delivery techniques. While overall ILL activity has increased only slightly, document services have increased their level of activity so that they now process 10% of all requests. UPS and Purolator are increasingly being used by document services and among special libraries in the same organization when the surface couriers are less expensive than USPS or the USPS is known to provide poor service in an

area. Yet, despite extensive discussion about document delivery over the past few years there have been few if any changes in the patterns of movement of materials among the public and academic libraries that account for the majority of all ILL.

The Human Factor:

The human factor in bringing about change has frequently been studied with regard to library automation--an area in which there is a great deal of activity--but it has been addressed only once with regard to the problem of bringing about change in something seemingly much more simple: document delivery--an area in which there is little activity. The sole study of document delivery that addresses the human factor is that of the American Institute of Physics, which recently concluded an extensive pilot project of telefacsimile transmission by satellite. The study team drew as its primary conclusion the fact that the "development of a viable document delivery system requires more than just a creative mix of system features....Even more important is the human factor. Technical feasibility does not guarantee user acceptance and system viability." ⁵⁰ The team reached that conclusion because despite the fact that they were able to document that searching and requesting materials online and transmitting documents by telefacsimile using satellite linkages posed no technical or copy quality problems, system use was generally low across the entire project.

The four libraries participating in the AIP project conducted only 263 searches in 20 months. Only 111 articles, totaling 593 pages, were requested--all by a single participant. All of the costs for searching, copying and transmission were taken from the special project budget and actually relieved the regular operating budgets of the participants.

According to interviews conducted at various stages in the project all librarians were enthusiastic in the beginning and promoted the service. After several months, the lack of patron response began to frustrate the librarians in all but one of the participating institutions--the one that did have patron response near the expected level. The conclusion of the study team was that the organizational environment was one factor. The "think tank" environment in the organization using the service led to greater user response than the "hold the budget line, look busy" environment prevailing in the other three organizations. Even more important, they concluded that the library using the new technologies most actively was the one that had already stressed its problem solving role to its users. Patrons defined problems and librarians decided on the information gathering strategies. The librarians were merely using a new tool. They made no point of the technology, but used it to get information into the hands of patrons more promptly. The less successful libraries were those in which the patrons were told of the new technologies and asked to determine which mode of request and document transfer should be used.

The AIP study suggests that it will have to be librarians who decide to improve document delivery and select the appropriate techniques for doing so. If patrons are to make a decision, it should be the time by which the materials are to be available, rather than the delivery means to be used.

Librarians' Satisfaction:

ISCI's mail survey and telephone interviews determined that almost all librarians are satisfied with USPS' first class mail for delivery of photocopies of journal articles. Even the commercial services report that of their users--a large percentage of whom are librarians--only 7 to 12% request overnight service and that they receive virtually no

complaints about document delivery. It is only the movement of books by USPS' library rate service that was rated as less than good or excellent.

The Cost Question:

The "bottom line" on document delivery will probably continue to be cost. If the price of fast transmission is higher than the benefits as perceived by librarians, much ILL traffic will continue to tolerate the lapsed time involved in slower methods. For this reason, it is likely that improved delivery systems will depend for their adoption on reductions in costs to libraries. Any electronic document delivery service must match the costs of more conventional delivery methods. While end users may be willing to pay a premium for a small percentage of documents urgently needed, electronic document delivery will only be economic if a high proportion of current interlibrary loan traffic is channelled through such delivery mechanisms.

It is significant that even though the users of commercial document services are relying extensively on electronic techniques for requesting materials and paying up to \$14 per journal article, they are requesting overnight service only 7 to 12% of the time. It therefore appears likely that were one to offer rush service via telefacsimile at a yet higher fee in a library, demand would be low.

Telefacsimile equipment and telecommunications costs are such that only high volumes of thousands of pages a month can bring the costs down to \$.50 or so per page. At \$.50 per page, the average journal article--which contains fewer than 10 pages--would cost \$5.00 to reproduce and send--a cost that might be attractive to a large number of users. However, a volume of only a few hundred pages a month would force costs up to \$1.00 to \$3.00 per page--a figure few libraries or their patrons would accept. It

appears to be a chicken and egg situation. Libraries and document services do not want to introduce new services that require additional outlays from their budgets, and users are hesitant to pay premium prices for a service with high unit costs, particularly in a situation in which there appears to be no apparent discomfort with current document delivery performance.

Overall Satisfaction Time:

Presumably the user isn't going to look at document delivery as a separate issue. If the average turnaround time for ILL is 10 to 16 days and up to half of that time is for document delivery, the choice between reducing the document delivery time to less than an hour using electronic techniques or to one or two days using a surface courier might not be seen as very important--either would be an improvement, but neither would give the requestor immediate access to information. The adoption of electronic techniques would reduce the satisfaction time to 5 to 8 days and the adoption of two-day surface courier service would reduce the time to 7 to 10 days. The difference in price between the two document delivery methods might be more important than the difference in time.

Variety of Availability:

Why not rely on full-text data bases that can be transmitted at much greater speed than telefacsimile images? While fast availability is one aspect of convenience, another aspect which may be even more important is the convenience of being able to get a variety of documents, with different imprints and sources, from a single supplier. That is why major collections of printed materials will continue to play an important role in meeting the information needs of people and why libraries will continue to be actively used. Russon has stated, "Notwithstanding the large concentration of demand on a small proportion of

titles, in absolute terms, any electronic publishing system must hold and must make available a large number of titles if it is to generate significant demand."⁵¹

The Document Delivery Issue for the Eighties:

For the next five to ten years the bulk of the needs of most information users will continue to be met from printed sources--the heart of most libraries' collections. The challenge for libraries will be to augment these traditional resources with information stored in electronic form. When a sufficient body of electronic information has been collected, attention will turn to the transfer of it among libraries and between document services and libraries. Russon expressed the view that: "Librarians will also be seeking to exploit technology to ensure that they have the most cost effective storage and retrieval methods for the literature they wish to have available locally...[and will be rethinking] the mix of literature that they make available locally in hard-copy form in anticipation of use and that which they seek from document delivery services in response to demand."⁵²

The transfer of printed books and photocopies of journal articles between libraries--or between document services and libraries--will remain the paramount document delivery issue for at least the balance of the eighties. It should therefore be the focus of attention, in consideration of practical document delivery programs. The recommendations of the consultants are set forth in the following chapter.

VIII. Conclusion

The first seven chapters of this report contain the results of the consultants' study of document delivery and identification of the trends. The information was obtained from an extensive literature review, mail and telephone surveys, and materials in ISCI's files.

The literature review included online searches of ERIC and LISA (Library and Information Science Abstracts) data bases from 1973 to the present and Online Chronicle from 1981 to the present using the descriptors: document delivery, delivery services, electronic mail and telefacsimile in libraries, and interlibrary loan. Some 373 citations were identified, of which more than 200 were examined and 60 reproduced and used in the study.

The questionnaires sent to 185 libraries and document services were pre-tested in eight telephone interviews. The slightly higher than 50 percent response rate is statistically acceptable for a study of this type and produces a reliability level of 90 percent. The forms are included in the Appendix, as is the telephone survey outline used with major suppliers. A list of organizations contacted has been supplied to the Council under separate cover, but will not be published because ISCI conducts all surveys and telephone interviews with assurances of confidentiality.

The charge to the consultants was not only to study document delivery and identify the trends, but also to prepare a working document addressing the availability of various types of requestor and supplier data, and the likelihood of such information being made available for the purposes of a comprehensive document delivery study. The consultants were also to develop a recommended sampling strategy for a comprehensive study.

While there are no standards for what constitutes adequate document delivery service, the consultants have formed the opinion that document delivery is presently weak. It should not require an average of 10 to 16 days for a patron to get an item held by another library, nor for the transit time to be an average of 6 days or more. Nevertheless, document delivery does not appear to be a high priority concern of the library profession as a whole, but rather of a limited number of concerned librarians who are actively assessing the future of libraries.

The low level of concern expressed by library administrators and persons responsible for interlibrary loan in the libraries contacted may be partially attributable to the fact that most libraries' annual interlibrary loan volume amounts to only one percent or so of the annual circulation level and because library patrons appear not to be pressing them to make changes in the service.

Were document delivery to be improved, it might not significantly change the satisfaction time--the overall time required from initial request to the actual availability of the material to the patron--because several other components collectively require half or more of the total time for satisfying a document request. Improving document delivery time by 50 percent might change the satisfaction time by but 25 percent.

The consultants also determined that electronic technologies do not yet play a significant role in document delivery. Digital telefacsimile, potentially the most significant technology for document delivery, has been dismissed by many librarians because of bad results in trials of the older analog equipment and because of concerns about high cost.

The consultants estimate that electronic document delivery could be accomplished for \$.50 or less per page using properly selected digital telefacsimile equipment. This is a realistic planning figure if a library or other organization exchanges at least 500 pages of photocopies a month with institutions that also have digital telefacsimile equipment. Costs rise above \$.50 per page if the machine's rated capacity is substantially higher than the actual level of use, if the transmissions are made over regular dial-up telephone lines during daytime hours, or the equipment is constantly attended.

The consultants determined that suppliers--both libraries and document services--have extensive data about the number of orders received, the number filled, and to whom the documents are sent. Information about the document delivery medium used is impressionistic and cost data is somewhat sketchy. Virtually none have reliable information about document delivery time. None of the interviewees had polled requestors about their perception of document delivery.

The requestors have statistics about number of requests, when and to whom sent, and when received, but few have calculated satisfaction time or cost. None have studied document delivery time.

Only the commercial document services expressed reluctance to make their data available were a major document delivery study to be undertaken.

In light of the limited information available about document delivery, any study would have to rely on careful monitoring of actual practices of a representative sampling of libraries and document services. The most cost effective way of doing this would be to have appropriate persons

keep diaries or logs which included this type of information added to that which they normally record.

The consultants have serious reservations about the preparation of a draft survey for a major study of document delivery because there is no evidence that the library and document services communities at large are seriously concerned about the performance of the document delivery system. While the consultants have strong biases in favor of improving document delivery, they reluctantly conclude that the actual performance of the system has done an excellent job of convincing users to wait. Libraries contacted appear not to be getting many complaints about the performance of the system. More research might provide more accurate data than that presented in this report, but the consultants are of the opinion that more data is not the key to the document delivery problem.

The conventional wisdom is that it is important to establish that a market exists before offering a new product or service. Is that realistic in this case? On the few occasions libraries have asked users about their level of satisfaction with present interlibrary loan/document delivery services, the responses have been quite positive. The consultants called several users identified by librarians, but got uniformly positive responses despite satisfaction times of two to three weeks. They, therefore, did not continue making telephone calls. The librarians and document service specialists interviewed in this study also expressed general satisfaction with document delivery. While the size of the study sample was small and the response rate to the mail survey was just over 50 percent, there is no evidence that there is a demand for improvement in document delivery from either users or librarians.

That does not mean that were users to be asked if they would like the service to be faster, they would say no. But

what would they say if they were asked to pay for improved service? Could users be expected to forecast how often they would need rush service and how much they would be prepared to pay for it? Any study of this type would, therefore, have to be carefully designed. It is doubtful that a survey of users would be worth the considerable expense involved. A major nationwide market study normally involves a minimum of 1,000 interviews and a cost of more than \$100,000.

The consultants believe that document delivery can and should be improved. It is their impression--one which cannot be documented--that what has generally been characterized as satisfaction is actually acceptance of a pattern which has existed for decades. The first time user quickly learns that it takes weeks--not days--to get something which his or her library does not own. The expressions of concern about improved document delivery appear to be coming from leaders in the profession who are looking ahead to greater resource sharing as a means of coping with ongoing fiscal constraints.

Very few people--librarians or their patrons--have had the experience of rapid document delivery. Almost all of us have learned to work around the limitations of the system. A pilot or demonstration project would be one way of dealing with this apparent acceptance of something that might be improved. It would provide a basis for comparing present and potential performance of the system. For example, if it could be demonstrated that a high volume digital telefacsimile network among a small number of institutions could provide articles for \$.50 or less per page over a period of several months, that ILL use increased as patrons discovered that performance had improved, and that the improved service had actually made a difference to patrons, the results might affect the perceptions of the entire library community.

None of the digital telefacsimile pilot projects which have been undertaken to date have been of sufficient duration to obtain meaningful data, nor have participants been adequately prepared. None have linked locations with a history of high ILL traffic among them. The librarians in all of these pilot projects also appear to have made the same mistake underscored in the American Institute of Physics study: emphasis on the technology rather than on the service.

Another option which might be pursued would be to address the part of the document delivery system that appears weakest and can be improved at relatively low cost: the interlibrary movement of books. Most photocopies of journal articles move by first class mail, but books--which represent 60 percent of all interlibrary loans--are usually too bulky to be sent by first class mail and the alternatives of priority mail and library rate are very slow. Nor can books be cost effectively transmitted by electronic means. It may be possible to upgrade from USPS service and costly local delivery networks to statewide multitype library delivery networks modeled after those in use in the United Kingdom and Pennsylvania.

Were a cost study to be undertaken in a state which has several local delivery services and some individual library use of surface couriers, the total amount currently expended might be found to be such that with only a modest supplement a year-long demonstration project could be mounted. The effect of improving document delivery in an entire state for a year might be measured and used as the basis for formulating plans for other states, much as the initial delivery network study conducted in Great Britain led to the expansion of the concept over most of the island.

A future effort might tie several successful statewide delivery networks together into regions. In time state

boundaries might be replaced by regional zones. This would be natural were commercial couriers such as UPS or Purolator retained because they already use a regional organizational structure.

One of the emerging patterns of interlibrary loan which should be factored into any study is the sharing and linking of local circulation control and patron access catalog systems. By dialing into a shared system data base or into the systems of nearby libraries, it is possible to determine not only whether the needed items are held, but also whether they are currently available. The request can immediately be electronically transmitted once that determination is made. There are now more than 500 libraries that share automated library systems, primarily in the states of Connecticut, Illinois, and Texas. In a recent survey ISCI determined that 11 state library agencies envision the linking of local automated systems as the major technology in interlibrary cooperation in their states in the future. The document delivery patterns may change as the mechanism for locating and requesting materials changes.

In summary, if the Council agrees with the consultants' conclusion that it would not be fruitful to pursue the original intent of formulating a sampling strategy for a comprehensive study of the document delivery component in the satisfaction time for what is commonly known as "interlibrary loan", and yet wishes to make a further contribution towards the resolution of the document delivery dilemma, the consultants suggest that the Council consider authorizing further work on one of the following tasks:

- (1) Undertake preliminary design work for a survey to interview a large number of interlibrary loan end-users to determine their needs and their preparedness to meet the costs entailed in improved document delivery service.

- (2) Undertake preliminary design work for a telefacsimile pilot program to be conducted among a number of carefully selected libraries with a history of a large volume of exchange of photocopies.
- (3) Undertake preliminary design work for a demonstration program for a year-long statewide multitype monograph delivery network.

The consultants believe that options (2) and (3) are potentially the most useful. They are not mutually exclusive. Since the Research Libraries Group has recently obtained funding for a pilot telefacsimile program, the Council may wish to ascertain whether this project can serve as the pilot the consultants propose or as a component in a more extensive study. Should the pilot telefacsimile program not require a significant amount of the Council's time or funds, it may be desirable for the Council's own immediate efforts to be devoted to a study of the surface delivery system.

One of the most useful ideas submitted by reviewers of the preliminary draft of this Report is that a study of interlibrary loan users might be linked to a telefacsimile study. It could supply a "before" and "after" perspective of users if they were interviewed both as they request and receive materials.

The consultants are mindful of the fact that many of those instrumental in the Council's decision to fund this study envisioned that the result would be a planning document and draft survey instrument for a very extensive study of all aspects of the the interlibrary loan and document services systems. While the consultants have concluded this should not be done, they remain prepared to develop a draft

survey instrument for an in-depth study if instructed by the Council.

The Council may also wish to consider a future study of a related issue in interlibrary loan: the processing time within libraries and document services that supply the needed materials. This appeared to be of greater current concern to the requestors contacted by ISCI than the time required for document delivery. The suppliers, in turn, were most concerned about the quality of bibliographic citations received from requestors.

We will be happy to meet with representatives of the Council and the Network Advisory Committee to discuss this Report. We will also be happy to talk with other individuals and groups in the Washington, DC, metropolitan area.

FOOTNOTES

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APPENDICES

Summary of Significant Statistics

Net Recipient Survey

Net Supplier Survey

Major Suppliers Telephone Survey

Summary of Significant Statistics

Annual volume of ILL by Library Type	25,000,000
Document Services	2 500,000
Public	57.7%
Academic	21.2%
Federal	8.0%
Special	13.1%
Fill Rates	
Serials	89.5%
Books	86.5%
Percentage filled by photocopies	21.0%
Serials	77.9%
Books	39.5%
ILL Cost	
Borrowing	\$10.69
Lending	\$ 6.23
Satisfaction time average	10 to 16 days
In-state	8.5 days
Interstate	18 days
Material transmit time average	6.3 days
Inconvenience to users in ILL	10 to 19.9%
Library satisfaction with document delivery	
USPS Library rate	77%
All other modes	85%
Cost of surface delivery (per item)	\$.62 to \$2.50
Cost of telefacsimile (per page)	\$.50 up

INFORMATION SYSTEMS CONSULTANTS INC.

P.O. BOX 34504, BETHESDA, MD. 20817 (301) 299-6606

DOCUMENT DELIVERY SURVEY

NET RECIPIENT

- A. Institution: _____
- B. Contact: _____
- Position: _____ Phone: _____
- C. Annual number of titles Received: _____ Supplied: _____
- D. Percentage received as photocopies: _____
- E. Percentage received from in-state: _____ out-of-state: _____
- F. Percentage received from commercial suppliers: _____
- G. Time taken from request to receipt of material (%):
1. Two days _____ 2. Three days _____ 3. Ten days _____
4. Fifteen days _____ 5. Twenty days _____
- H. Cost of material received: _____
- I. Specify any costs that are charged to the end-user. _____
- J. Document delivery method for incoming materials:

	<u>% of use</u>	<u>Degree of Satisfaction</u>
1. US Postal Service		
First class	_____	_____
Library rate	_____	_____
Priority mail	_____	_____
Express mail	_____	_____
2. Cooperative Delivery Network		
Consortium operated	_____	_____
State library	_____	_____
Purolator	_____	_____
UPS	_____	_____
Other (specify)	_____	_____
3. Contract Delivery Network		
Purolator	_____	_____
UPS	_____	_____
Other (specify)	_____	_____

		<u>% of use</u>	<u>Degree of Satisfaction</u>
4. Contract Courier	Purolator	_____	_____
	UPS	_____	_____
	Federal Express	_____	_____
	Emery	_____	_____
	Other (specify)	_____	_____
5. Telefacsimile	Analog	_____	_____
	Digital	_____	_____
6. Other (specify)	_____		

K. How would you rate the document delivery methods used to delivery materials to your institution? (Excellent, Very Good, Good, Fair, Poor.) Include comments as desired.

L. What changes might improve document delivery? _____

M. How much would you be willing to pay for excellent document delivery service? _____

N. How does the pattern whereby your institution supplies materials differ from that of receipt?:

1. In method(s) used: _____

2. In time: _____

3. In cost: _____

4. In satisfaction: _____

O. Name any document delivery studies we should seek to obtain: _____

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DOCUMENT DELIVERY SURVEY

NET SUPPLIER

- A. Institution: _____
- B. Contact: _____
- Position: _____ Phone: _____
- C. Annual number of items Supplied: _____ Received: _____
- D. Percentage supplied as photocopies: _____
- E. Percentage supplied in-state: _____ out-of-state: _____
- F. Amount and method of reimbursement for services: _____
- G. Rush service availability and terms: _____
- H. Document delivery method used to supply materials:

	<u>% of use</u>	<u>Degree of Satisfaction</u>
1. US Postal Service		
First class	_____	_____
Library rate	_____	_____
Priority mail	_____	_____
Express mail	_____	_____
2. Cooperative Delivery Network		
Consortium operated	_____	_____
State Library	_____	_____
Purolator	_____	_____
UPS	_____	_____
Other (specify)	_____	_____
3. Contract Delivery Network		
Purolator	_____	_____
UPS	_____	_____
Other (specify)	_____	_____

		<u>% of use</u>	<u>Degree of Satisfaction</u>
4. Contract Courier	Purolator	_____	_____
	UPS	_____	_____
	Federal Express	_____	_____
	Emery	_____	_____
	Other (specify)	_____	_____
5. Telefacsimile	Analog	_____	_____
	Digital	_____	_____
6. Other (specify)	_____		

I. If any data is available on the costs of the various delivery methods, please specify. [Name of other contact if needed]:	_____		

J. Give your assessment of the various document delivery methods available to your institution. (Excellent, Very Good, Good, Fair, Poor.) Include comments as desired:	_____		

K. How long does it normally take to			
1. process requests for material?	_____		
2. deliver the material once it has been processed?	_____		
L. What changes might improve document delivery?	_____		

M. How does the institution's experience as a recipient of materials differ from that as a supplier?			
1. In method(s) used:	_____		
2. In time:	_____		
3. In cost:	_____		
4. In satisfaction:	_____		
N. Name any document delivery studies we should seek to obtain:	_____		

DOCUMENT DELIVERY TELEPHONE SURVEY
Commercial Suppliers

- A. Firm: _____
- B. Contact: _____
Position: _____ Phone: _____
- C. Annual number of items Supplied:
Under 50,000 ____; 50,000 to 100,00 ____; over 100,000 ____
- D. Amount and method of reimbursement for services: _____

- E. Rush service availability and terms: _____

- F. Source of requests (%):
Special Libraries ____; academic ____; public ____; Non-lib ____
- G. How received (%):
Mail ____; phone ____; electronic mail ____; other _____
- H. Time required for processing (%):
One day ____; two days ____; three days ____; longer ____
- I. Document delivery method used to supply materials:
- | | <u>% of use</u> | <u>Degree of Satisfaction</u> |
|---------------------------------|-----------------|-------------------------------|
| 1. US Postal Service | | |
| First class | _____ | _____ |
| Library rate | _____ | _____ |
| Priority mail | _____ | _____ |
| Express mail | _____ | _____ |
| 2. Commercial Delivery Service: | | |
| Purolator | _____ | _____ |
| UPS | _____ | _____ |
| Emery/Fed Exp | _____ | _____ |
| Other | _____ | _____ |
| 3. Telefacsimile | _____ | _____ |
| 4. Online full-text | _____ | _____ |
- J. How is the document delivery pattern expected to change over the next five years? _____

